CLAIMS

What is claimed is:

1. A process for forming an organic electronic device comprising the steps of:

forming a first conductive member and a conductive lead over a substrate, wherein the first conductive member and conductive lead are spaced apart from each other;

forming an organic layer over the substrate, the first conductive member, and the conductive lead;

forming a patterned conductive layer over the organic layer, wherein:

the patterned conductive layer includes a second conductive member; and

the patterned conductive layer creates an exposed portion of the organic layer and an unexposed portion of the organic layer; and

dry etching at least the exposed portion of the organic layer to expose a portion of the conductive lead using at least one oxygen-containing gas.

2. A process for forming an organic electronic device comprising the steps of:

forming an organic layer comprising organic material over a substrate;

removing the organic layer at a first area of the substrate; and

dry etching using at least one oxygen-containing gas the organic layer at a second area of the substrate, wherein removing the organic layer at said first area and dry etching are performed as separate steps.

3. The process of Claim 2, wherein removing the organic layer is performed using laser ablation.

4. The process of Claim 2, wherein the first area corresponds to the pixel array and the second areas lies outside the pixel array.

5. The process of Claim 1 or 2 wherein dry etching is performed during more than one step.

6. The process of Claim 1 or 2, wherein the oxygen-containing gas is selected from a group consisting of O_2, COF_2, CO, O_3, NO, N_2O and mixtures thereof.

7. The process of Claim 1 or 2, wherein the gas further comprises a halogen-containing gas.

8. The process of Claim 7, wherein the halogen-containing gas is selected from a group consisting of a fluorine-containing gas, a chlorine-containing gas, a bromine-containing gas, and an iodine-containing gas and a mixture thereof.

9. The process of Claim 8, wherein the fluorine-containing gas is selected from a group consisting of fluorocarbons which may or may not be saturated and may or may not include other halogen atoms, F_2, HF, SF_6, NF_3, iodo carbons, bromocarbons, chlorocarbons, chlorine-containing interhalogens, bromine-containing interhalogens, iodine-containing interhalogens, metal bromides, metal chlorides, metal iodides, metal fluorides, fluorine-containing interhalogens and mixtures thereof.

10. The process of Claim 7, wherein the halogen-containing gas is selected from the group consisting of F_2, HF, SF_6, NF_3, WF_6, MoF_6, TaF_5, ClF, ClF_3, ClF_5, BrF_3, IF_5, Cl_2, HCl, BCl_3, $TiCl_4$, $TaCl_5$, $MoCl_5$, WCl_5, HBr, BBr_3, BrF_3, BrF_5, I_2, HI, IF_5, CF_4 and mixtures thereof.

11. The process of Claim 1 or 2, wherein the gas is at least about 10% by volume an oxygen-containing gas comprising O_2, the halogen-containing gas comprising CF_4, and an inert gas comprising Ar.

12. The process of Claim 5, wherein the gas in at least a second step is at least one inert gas.

13. The process of Claim 12, wherein the inert gas is selected from a noble gas, N_2 and mixtures thereof.

14. The process of Claim 13, wherein a reducing gas is used during the second step.

15. The process of Claim 14, wherein the reducing gas is selected from the group consisting of H_2, NH_3, N_2H_4, N_2H_2 and mixtures thereof.

16. A process for forming an organic electronic device comprising the steps of:

forming first conductive members over a substrate, wherein the first conductive members comprise anodes for the organic electronic device;

forming conductive leads over the substrate;

forming an organic layer over the first conductive members and the conductive leads, wherein the organic layer comprises a hole-transport layer and an organic active layer;

forming a patterned first conductive layer over the organic layer, wherein:

the patterned first conductive layer comprises second conductive members that comprise cathodes for the organic electronic device;

forming the patterned first conductive layer is performed using a first shadow mask during a first physical vapor deposition; and

exposed portions of the organic layer are not covered by the patterned first conductive layer;

dry etching the exposed portions of the organic layer to expose portions of the conductive leads, wherein:

dry etching is performed during a first step and a second step;

during the first step, dry etching is performed using an oxygen-containing gas, a fluorine-containing gas, and an inert gas to remove substantially all of the exposed portions of the organic layer to form openings extending through the first and second organic layers, wherein each of the openings has an edge substantially coterminous with an edge of its overlying second conductive member; and

during the second step, dry etching is performed using an inert gas to physically remove an undesired material overlying the first conductive leads or the second conductive members;

forming a patterned second conductive layer over the patterned first conductive layer, wherein:

forming the patterned second conductive layer is performed using a second shadow mask during a second physical vapor deposition;

the second shadow mask has a pattern different from the first shadow mask;

the patterned second conductive layer comprises third conductive members, wherein each of the third conductive members overlies substantially all of a corresponding second conductive member and overlies a portion of one of the conductive leads;

each of the third conductive members contacts the corresponding second conductive member and one of the conductive leads and extends into the opening.

17. The process of Claim 1, 2, or 16, wherein dry etching is performed at a power density in a range of approximately 10 to 5000 mW/cm^2 and voltage of about 10 to 1000 V.

18. The process of Claim 1, 2, or 16, wherein dry etching is performed at a pressure in a range of approximately 7.5 to 5000 mTorr

and a gas feed rate at about 10 to 1000 standard cubic centimeters per minute.

19. The process of Claim 18 wherein the gas flow rate is between about 100 to 500 sccm and the gas pressure is between about 100 to 500 mTorr, a voltage is between about 20 to 300 V and a power density is between about 50 to 500 mW/cm^2.

20. The process of Claim 1, 2, or 16, wherein the substrate comprises a polymeric film.

21. The process of Claim 1, 2, or 16, wherein the organic layer comprises at least one material that is a charge transport, anti-quenching, light-emitting, or photodetector material.

22. The process of Claim 1, 2, or 16, wherein the organic electronic device is a light-emitting diode, light-emitting display, radiation sensitive device, photoconductive cell, photovoltaic cell, photoresistor, photoswitch, photodetector, phototransistor, or phototube.

23. The process of Claim 1, 2, or 16, wherein the device is an organic light-emitting diode display.

24. A method of dry etching a performance sensitive element of an organic electronic device, said method comprising the steps of: (a) having at least one performance sensitive element on the substrate spaced apart from a first conductive member, wherein at least one of the performance sensitive elements is a conductive lead; (b) placing organic material on the performance sensitive element and the first conductive member; (c) forming a patterned conductive layer over the organic material exposing a predetermined portion of the performance sensitive elements; and (d) dry etching the organic material in the exposed areas of the performance sensitive elements using at least one oxygen-containing gas.

25. The method of Claim 24, wherein the oxygen-containing gas is selected form the group consisting of O_2, COF_2, CO, O_3, NO, N_2O and mixtures thereof.

26. The method of Claim 25 wherein the oxygen-containing gas further includes a gas selected from the group consisting of fluorocarbons which may or may not be saturated and may or may not include other halogen atoms, F_2, HF, SF_6, NF_3, metal fluorides, fluorine-containing interhalogens, chlorine-containing, iodine-containing, bromine-containing, and mixtures thereof.